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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/809,421

03/26/2004

Jin Ki Kim

PAT 980-2

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12/29/2005

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EXAMINER

HUR, JUNG H

ART UNIT

PAPER NUMBER

2824

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/809,421

Applicant(s)

KIM, JIN KI

Examiner

Jung (John) Hur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 7-23 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-4 and 7-23 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Amendment

1. Acknowledgment is made of applicant's Amendment, filed 13 October 2005. The changes and remarks disclosed therein have been considered.

Claims 5 and 6 have been cancelled by Amendment. Therefore, claims 1-4 and 7-23 are pending in the application.

Specification

2. Claim 21 is objected to because of the following informalities: In line 3 of claim 21, after "the common", it appears that --searchlines-- is missing. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-4, 7-13 and 15-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Hata (U.S. Pat. Appl. Pub. No. 2002/0080638).

Regarding claim 1, Hata, for example in Figs. 1-3, 8 and 9, discloses a hybrid content addressable memory array comprising: a first memory portion (for example, the even word array 12a in Fig. 1) having a first type (for example, a ternary type) of content addressable memory cells arranged in rows and columns (i.e., with reference to the embodiment disclosed in

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paragraph [0091] and Fig. 8, the even array 12a in Fig. 1 independently configured and controlled as a ternary type); a second memory portion (for example, the odd word array 12b in Fig. 1) having a second type (for example, a binary type) of content addressable memory cells arranged in rows and columns (i.e., with reference to the embodiment disclosed in paragraph [0091] and Fig. 8, the odd array 12b in Fig. 1 independently configured and controlled as a binary type), the second type of content addressable memory cells being electrically coupled to the first type of content addressable memory cells (via, for example, the OR and AND gates in WORD 1 block of Fig. 1), each second type (binary) of content addressable memory cell being smaller in size than each first type (ternary) of content addressable memory cell (since a ternary type cell is comprised of two binary type cells; see for example Fig. 8).

Regarding claims 2-4, 7-13 and 15-20, Hata further discloses that the first memory portion and the second memory portion include matchlines, each matchline of the first memory portion being coupled to the first type of content addressable memory cells (for example, the output of the CAM word WORD 0; see also Fig. 8), and each matchline of the second memory portion being coupled to the second type of content addressable memory cells (for example, the output of the CAM word WORD 1; see also Fig. 8);

wherein the first type of content addressable memory cells include ternary content addressable memory cells and the second type of content addressable memory cells include binary content addressable memory cells (see for example Fig. 8 and paragraphs [0090] and [0091]);

wherein the matchlines of the first memory portion and the matchlines of the second memory portion are interleaved with each other (since the even and odd words are inherently interleaved, or alternating; see also a possible alternate arrangement implied in Figs. 2 and 9);

wherein the ternary content addressable memory cells include SRAM based ternary content addressable memory cells (since a ternary cell comprises two SRAM-based binary cells; see for example Fig. 3 for an SRAM-based binary cell);

wherein the binary content addressable memory cells include SRAM based binary content addressable memory cells (see for example Fig. 3);

wherein at least one of the first and the second type of content addressable memory cells include configurable ternary-binary content addressable memory cells (via the binary signal in Fig. 1, with reference to the embodiment disclosed in paragraph [0091] and Fig. 8);

wherein the first type of content addressable memory cells and the second type of content addressable memory cells of a row are coupled to a logical matchline (Match_1 in Fig. 1; for example, the matchlines of WORD 0 and WORD 1 in the first row of Fig. 1 arrangement are coupled to Match_1 via OR and AND gates within WORD 1 block, with reference to the embodiment disclosed in paragraph [0091] and Fig. 8);

wherein the logical matchline includes a segmented matchline (for example, segmented into WORD 0 matchline and WORD 1 matchline for the first row in Fig. 1 arrangement);

wherein the segmented matchline includes a first matchline segment (WORD 0 matchline) and a second matchline segment (WORD 1 matchline);

wherein the first type of content addressable memory cells are coupled to the first matchline segment (WORD 0 matchline in the ternary even word array, with reference to the

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embodiment disclosed in paragraph [0091] and Fig. 8) and the second type of content addressable memory cells are coupled to the second matchline segment (WORD 1 matchline in the binary odd word array, with reference to the embodiment disclosed in paragraph [0091] and Fig. 8).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 14 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata (U.S. Pat. Appl. Pub. No. 2002/0080638) in view of Voelkel (U.S. Pat. No. 6,108,227).

Regarding claims 14 and 21-23, Hata discloses a memory as recited in claims 1-4, 7 and 8, with the exception of the first type of content addressable memory (CAM) cells and the second type of CAM cells of a column are coupled to common searchlines.

Voelkel discloses an arrangement for a hybrid CAM wherein a first type of CAM cells and a second type of CAM cells of a column are coupled to common searchlines (see for example column 7, lines 5-23 in which the ternary and binary types are arranged on a row-by-row basis, resulting in common searchlines, for example, Cy and Cy_ in Fig. 5, for both types of cells in a column).

Further, Hata, for example in Figs. 2, 8 and 9, discloses alternative means for forming ternary cells (either using two cells from two words, including a possibility of two words of two rows, or using two cells within one word).

Since the above teaching of Voelkel implies a desirability of having different CAM cell types on a row-by-row basis, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the memory of Hata, such that different rows (or different blocks of rows) are independently configured and controlled to have different CAM cell types (for example, using two rows of binary words to form a ternary word, similar to that implied in Figs. 2 and 9 of Hata), resulting in first and second types of cells in a column having common searchlines, for the purpose of providing an increased flexibility in configuring the CAM cells to accommodate needs for CAM arrangements with different rows having different cell types, without wasting storage bits (see for example Hata, paragraph [0024]).

Response to Arguments

7. Applicant's arguments with respect to claims 1, 15 and 21 have been considered but are moot in view of the new ground(s) of rejection, necessitated by Amendment. See rejections above.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Cheng et al. (U.S. Pat. No. 6,704,216), Gandini et al. (U.S. Pat. No. 6,169,685), Park et al. (U.S. Pat. No. 6,967,856), Nataraj et al. (U.S. Pat. No. 6,499,081), Pereira et al. (U.S. Pat. No. 6,697,276)

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jung (John) Hur whose telephone number is (571) 272-1870. The examiner can normally be reached on M-F 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jhh

A handwritten signature in black ink, appearing to read 'R. Elms', with a date '12/21/05' written below it.

RICHARD ELMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800